Communication Dynamics of Human-Machine Teams in Context Sensitive Battle-Field Environment

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http://hdl.handle.net/10945/68263

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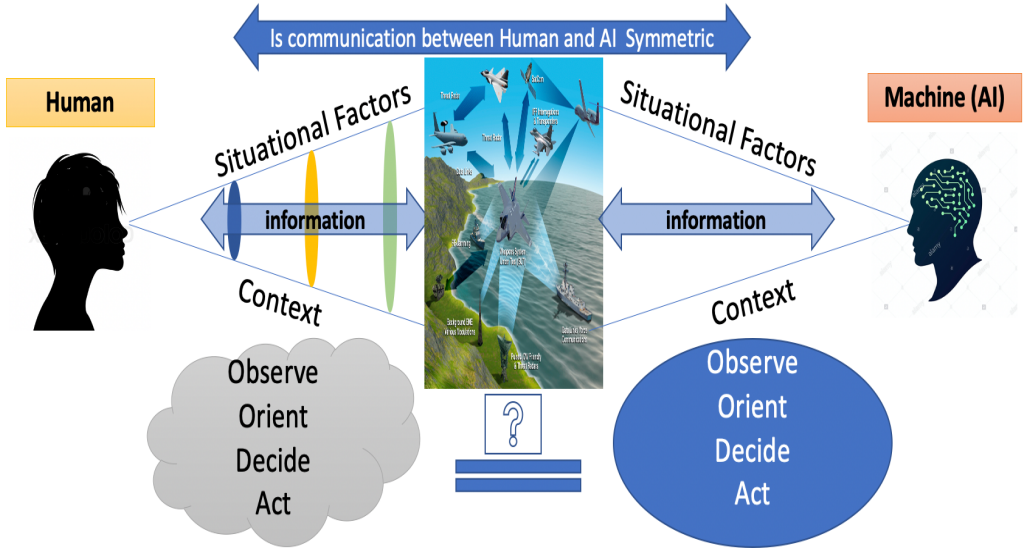

Human vs AI perceiving the same situation.

Problem Statement

- AI systems are employed to enhance warfighting capabilities in the form of Human Machine Teams (HMTs).
- AI mimics human behavior and designed with the rules of classical/Boolean logic.
- But human judgments do not always obey classical logic; in context sensitive situations, information processing and communication are subject to order effects.
- Our approach will study communication dynamics of HMTs with a mathematical and experimental method that address the limitations of the Boolean logic
- The theoretical aspect will capitalize on the quantum models of cognition.
- Categorization-Decision experiment will be conducted with time compression.
- The communication dynamics will be tested w/ and w/o machines. Sender/receiver perspective will be included as pull and push information environment.
- Our approach will use the OODA loop framework to compare decision making processes of the human and machine teammates.

Impact

- While leveraging the faster information processing capabilities of machines, , inadvertent over reliance via frequent communication can introduce mission critical vulnerabilities.
- This work is critical to understand and develop solutions to these type of vulnerabilities.
- This work is critical to understand communication dynamics in HMTs and findings will be used to better integrate and employ machine teammates via HMTs to enhance warfighting capabilities.
- The effect of the difference between human-human, human-machine communication will be measured in the experiment.
- To measure the success, the findings of the experiment will be submitted to Computer in Human Behavior journal and presented to DoD Human Factors community at DoD HFE TAG.

Transition

- Military Sealift Command (MSC) has already initiated collaboration efforts to integrate a synthetic team to their decision process. This effort is a joint effort with NPS, Old Dominion University and MSC.
- Air Force Research Lab , 711th Human Performance Wing research scientists collaborates in extended work to understand team behavior in cyberspace.
- Arizona State University and Old Dominion University are collaborating with Naval Postgraduate School for advanced research program to integrate synthetic teammates into the decision process.
- One of the leading autonomous system research program is Goal-Driven autonomy; this research involves goal-seeking/rebel agents which can communicate with humans. The findings of this work can be used in this program.

Seed Research Program 2021

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